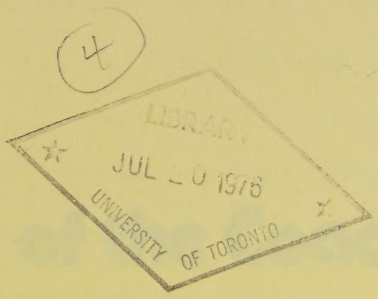


National Coaching Development Program

NOTES

LEVEL I: THEORY

Ontario

Ministry of Culture and Recreation

Sports and Fitness Division

Hon Robert Welch
Minister
Malcolm Rowan
Deputy Minister

Role of the Coach

(COACH TO RECEIVE THIS PRIOR TO COURSE)

PREPARATORY INFORMATION FOR COACHES

The role of a coach is a complicated one. How the coach functions is critical. The coach must interact, relate to, and react to many varied individuals and/or groups. This is no easy job and is often under-played. It might be a good exercise at this time to reflect on the list below. It contains many of these groups or individuals the coach could be forced to recognize:

- parents
- athletes
- media
- officials
- other coaches
- business personnel
- community agencies.

Can you think of any other individuals or groups you personally come in contact with in your own individual job as a coach?

Let's take the most important interaction - the athletes or players and develop it a little. The coach is influential. He is influential not only with respect to the life of an athlete in the game or on the playing field but also in other facets of his life ... educational goals, general lifestyle. Is this influence positive? Does it contribute to the growth of the individual as a person? Are you a good leader in this situation?

Two questions you should consider:

WHY DO I COACH?

WHY DO ATHLETES PARTICIPATE?

Several reasons are given below but before looking at them ask yourself these two questions. Jot down your own answers before reading the list below:

WHY COACH

- Need to dominate
- Need to achieve
- Need for rewards
- Need to help others
- Desire to see others succeed
- Joy of seeing accomplishment in others.

WHY PARTICIPATE

- Friendship
- Enjoyment
- Pressure from parents and/or peers
- Recognition
- Joy of effort.

If as a coach you are influential and responsible you are in a position to assume a major leadership role. Define the term leadership as it fits your situation. Does it resemble any of the definitions below:

1. "A leader is a person with power over others who exercises this power for the purpose of influencing their behavior."

2. "The successful leader is one who is keenly aware of those forces which are most relevant to his behavior at any given time. He accurately understands himself, the individuals and group he is dealing with, and the company and broader social environment in which he operates ... But this sensitivity or understanding is not enough, ... The successful leader is one who is able to behave appropriately in the light of these perceptions. If direction is in order, he is able to direct; if considerable participative freedom is called for, he is able to provide such freedom."

3. "Leadership is a social interaction process. It is a set of relationships which allow a leader to affect the behavior of the individuals under him; his followers."

4. "Leadership is the behavior of an individual when he is directing the activities of a group."

Think of a recent coaching situation in which you as a coach were involved. Describe it briefly:

Read over your description. Have you identified the key happenings in the situation?

What leadership behavior or pattern do you feel you followed? What were the leadership characteristics you feel you displayed?

Evaluate your performance as a leader and a coach on a scale

LEAST SUCCESSFUL MOST SUCCESSFUL

1 2 3 4 5 6 7

Evaluation of leadership skills and the effectiveness of the job done can be examined by assessing success or failure on the following chart:

1. Attempted leadership: A coach attempts to change or influence a player's skill level.

2. Successful leadership: The player actually changes or is influenced as a result of the coach's efforts. His skill is reflective of the coaching.

3. Effective leadership: The player's change in skill brings him satisfaction, rewards or goal attainment.

There are three behavior patterns commonly described theoretically in reference to leadership. They are:

Autocratic;
Supportive;
Instrumental.

An autocratic leader is usually dogmatic in his relations and arbitrary in his decision making. He is in charge of his ship and feels often that because he is responsible for his own actions that he need not accept others' ideas unless they are in tune with his.

A supportive leader feels others' views are important and encourages their participation and involvement in decisions. Decisions in this setting are not necessarily made by vote. It is hoped cooperation would be strong and develop in this system because of the close working relationship between subordinate and superior.

An instrumental leader actually is doing things in an effort to achieve group goals or organizational goals. He is constantly searching for the most effective way of doing things to control available resources. He is a planner, coordinator, and implementor.

Do you feel that you could define your behavior pattern by using one of these or are you a blend of all three most times?

It is important to recognize that leadership in a group is focused on an individual but that an individual can change depending on the situational characteristics. When other leaders than the one who has responsibility for the groups' actions arise we call them informal leaders.

In addition, within groups, there may be many informal leaders who are operating either in cooperation with, or in antagonism with, the formal leader. These people should be identified. They can have many powerfully positive or negative effects on a group.

As a coach, your awareness of the potential of all group members is essential. You should be aware of how much influence the captain of the team has over others or whether others are initiating the action, and influencing the team. Who are they? What are their motives? If you can identify these individuals it may be possible to work through them either directly or indirectly to achieve the goals and objectives of the program.

Up until this point, two words have been stressed for coaches as leaders:

- Influential,
- Responsible.

Coaches have two other important functions in their role which should be considered next:

- They set the expectations for the group.
- They motivate the group.

Consider these two carefully. Do you feel you should set realistic expectations, high expectations or low expectations? What would be the outcome if you applied each?

How do you motivate your players? How do you get maximum results and efforts from each of them individually?

Think about these two areas carefully and be prepared to discuss them in the course group sessions.

I shall not pass this way again. Any good thing that I can do, or any kindness that I can show, let me do it now! Let me not defer it or neglect it. For I shall not pass this way again.

Grellet

SUMMARY MATERIAL - ROLE OF THE COACH

TO BE HANDED OUT AS A REVIEW

It is hoped that through this session you, as a coach, are now able to:

- Identify why you coach;
- Identify why you should be coaching;
- Identify what your role is;
- Identify why athletes participate.

There is no right or wrong answer because all of us have different needs and hence different motivations. Realizing this and therefore being able to understand it in your own coaching situation will assist you to be a successful leader.

A leader and a coach is influential both in and out of the actual coaching situation and is responsible for those influenced by him/her.

Informal leaders are critical to the success of a coaching situation. Identifying them is important, but even more important is the need to channel their energies in a positive direction.

How you motivate, how you set expectations are important. You are the key to the participants success for themselves as people. An overemphasis on winning can create certain problems. In review they are

- Restricted and inappropriate participation;
- Unrealistic and unreasonable expectations;
- Undesireable violent, immoral and anti-social behavior.

ONTARIO COACHING DEVELOPMENT PROGRAM
LEVEL 1 - THEORY

CONCEPTS FOR COACH TO CONSIDER BEFORE UNDERTAKING THE UNIT ON MOTOR LEARNING

We have discussed a number of topics in the area of sport psychology, namely, feedback, reward, self-concept, child-centered activity, and others.

Our next step is to consider two more topics related to human learning and motivation. Specifically, these next two concepts deal with the specificity of learning and arousal level.

Consider the following areas of concern between now and the next time we meet.

1. What can we do in practice sessions to insure maximum usage of the time available?

2. What is negative transfer? Do we sometimes practise skills that produce negative transfer? Examples?

3. How can we best teach skills in order to produce positive, or optimal, transfer to a game situation? Examples?

4. Should we attempt to simulate conditions such as fatigue and stress, in our practice sessions? Why? Why not?

5. What is meant by arousal? What causes arousal?

6. Can you think of sports, or skills, that require high arousal? Low arousal?

7. How may you affect the level of arousal in your players? Increase it? Decrease it?

8. Is high arousal best for beginning stages of skill learning? How about for intermediate and advanced stages?

9. Are some children prone to being anxious? If so, how do you handle this type of child, keeping in mind that your first priority is his/her development?

MOTOR LEARNING - SUMMARY FOR COACHES

1. The nervous system is similar to a computer. Skill patterns (i.e. the way we tip a basketball) are dependent on the type of information (practice techniques and patterns) that we feed in.

2. The more closely we simulate game conditions in our practice sessions, the better our performance in the game will be.

   Example 1: In a basketball game, free throw shooting is often necessary when the individual is tired. Thus, players should practise free throws in a fatigued state as well as when they are fresh.

   Example 2: Tennis volleys at the net are most productive when they are hit away from an opponent. Thus the players should hit the majority of their practice volleys away, rather than back at, their opponents.

3. Specificity of practice (principles 1 and 2 above) is only necessary after the proper motor patterns have been established. For example, a tennis player should learn the proper stroke mechanics involved in volleying a tennis ball before he worries about the specific direction etc., in which to hit the ball.

4. As the level of arousal increases (competition stress) the more important the principle of specificity becomes. This is because, under stress, the response that has been practised (dominant response) will be even more likely to occur (i.e. the performer will revert to automatic reactions.) Thus, be sure that the automatic reaction (tennis volley) that you instil in your players, through practice, is the reaction (properly placed volley) that is required in the game situation.

5. Appropriate arousal levels are necessary for both optimal performance and enjoyment of the sport situation on the part of the performer.

6. Optimal levels of arousal vary with the stage of learning and the difficulty of the task.

   Example 1: A child in the early stages of learning to do a turn in swimming should be at a low level of arousal. He/she has enough to concentrate on without the added burden of stress, anxiety, etc., that may occur with, for example, the presence of spectators.

   Example 2: An easy task (one that does not require great amounts of concentration on the mechanics of the movement) is most often facilitated by high arousal e.g. tackling in football.

7. To reduce arousal, provide an atmosphere of understanding - a non-threatening environment.

8. Competition, cheering, motivational instructions, recognition and reward are effective means of increasing arousal.

9. To provide for optimal child development, as well as better performance, the coach should become aware of those who experience great anxiety as well as those who need a pep-talk to increase their motivation in given situations.

Sports Medicine

PREPARATORY INFORMATION FOR COACHES

The following tasks are designed to stimulate your thoughts and ideas for the next session on sports injuries.

Problem

What would be your immediate reaction to the following emergency situation? A player has just collided with a goal post. He is lying on the ice and appears to be unconscious.

Assume that when you arrive on the location of the injury, the athlete is unconscious and not breathing. How would you respond?

Problem

Think back to the types of injuries your athletes experienced during the past season. How could these injuries have been prevented? Did you notice any trends in injuries?

List ten methods which could be used by your athletes to reduce the incidence and severity of injuries.

1.

2.

3.

4.

5.

6.

7.

8.

9.

10.

In preparation for the upcoming section on Sports Medicine, the coach should also obtain an up-to-date publication on first aid and review the contents. This will help in understanding some of the basic terminology to be used, as well as give insight into some techniques used in the management of injuries.

BIOMECHANICS - SUMMARY FOR COACHES

One of the most difficult problems which confronts us in coaching fundamental skills is detecting errors accurately and specifically.

If we are not accurate and specific in our error detection we cannot be accurate or specific in the type of instruction that we give to correct errors. As a result, we fall back on suggestions to our athletes that have little useful meaning to them because they are too general such as "drive harder", "skate", "you are swinging up at the ball", "thrust with your knees", and so on.

Skill coaching has not been well done in Canadian sport. One of the major reasons is that we have been too concerned with memorizing details, many of which are not crucial to the performance. Attempting to teach them only confuses the athletes particularly when we barrage them with eight or ten points. A second major factor which has retarded skill coaching is that we are too concerned about the body configurations or body positions that our athletes pass through during their performance, as if the skill was simply a series of still photographs. Most sport skills are dynamic and depend upon the speed with which certain movements are carried out, their accelerations, the sequence of body limb movements and their combinations, not on static body configurations.

Biomechanics

We are going to introduce you to a different approach to skill coaching than the detail memorizing we have been using relatively unsuccessfully for years. The advantage of this different approach is that memory work is reduced from hundreds of details to four or five of the principles listed on the last page. Singly or in combination, they account for every movement pattern you can imagine on land, in water or in air.

Systematic application of these principles combined with systematic observation of athletes will permit us to focus on the causes of errors rather than wasting time correcting symptoms of errors or unimportant idiosyncrasies in the performance.

The athlete, like all other objects on earth, must operate within an environment of forces which are exerted on him such as gravity, friction, and contact with objects that strike him or that he strikes. These are external forces. He must also operate within the limits of the muscle forces that he can generate and which can be used to oppose external forces and to overcome them. Thinking about and coaching skills in terms of forces, body limb speed, acceleration, total body momentum, body segment levers and muscle forces which produce motion is part of the "biomechanics of sport".

Biomechanics is the study of human motion by combining certain principles of physics (in particular, mechanics) with knowledge of the anatomical and physiological characteristics of a person to find out how a particular movement should be done.

For example, the human can be thought to be comprised of a series of segments linked at the joints. The arm consists of three segments, the upper arm, the forearm and the hand. The leg also has three segments, the thigh, the shank and the foot. Muscles cross each of the joints and cause the segments to rotate. The size of a thrust of a foot on the ground or a hand on a ball depends partly on the speeds at which each segment involved rotates and partly on the sequence of rotations of the segments. When the muscle forces at the hip, knee and ankle are summed and properly timed, a maximum thrust on the ground in a jump or run or on ice during skating, results. If the direction of the thrust is correct, maximum speed, height or length is achieved. If the force available at one of the joints is not used or is out of sequence a submaximal performance results. The principle of summation of joint forces and the principle of the continuity of joint forces have been violated. Studying the motion in this way immediately identifies the source of the error and permits a specific suggestion for correction.

In Level I there is time only to briefly introduce you to the first six biomechanics principles of motion. More detail and practice in applying them in the detection and correction of errors in performance will come in Level II.

If you can think of your athletes' performance in terms of force, speed, and acceleration of body segments instead of body configurations, Level I biomechanics may provide the basis for subsequently easier and better skill coaching.

TEN PRINCIPLES OF BIOMECHANICS

WHICH EXPLAIN ALL FORMS OF HUMAN MOTION

1. The principle of stability (equilibrium).

2. The principle of summation of joint force (joint torque).

3. The principle of continuity of joint force (joint torque).

4. The principle of the combined influence of force and the time of application of force (impulse).

5. The principle of summation of body segment velocities.

6. The principle of direction of force application (reaction).

7. The principle of production of rotational motion (angular momentum generation).

8. The principle of conservation of linear and rotational motion (conservation of linear and angular momentum)

9. The principle of manipulation of weight distribution (moment of inertia alteration).

10. The principle of rotational motion manipulation (segment angular momentum manipulation).

Growth and Development

PREPARATORY INFORMATION FOR COACHES

As part of the Coaching and Development Program with which you are about to be involved, there is a section entitled, "growth and development, implications to coaching children". This section will deal with various aspects of human growth such as growth and development patterns, rates of growth, sex differences and maturation effects. The aim of such a presentation is, of course, to help you understand how and why children grow as they do, why we have such great individual differences and how we may better understand them as we become involved with them as various age-group coaches.

In preparation for such a presentation, you are encouraged to take a second look at the young people with whom you coach in organized sport and begin to think over the following questions. This exercise will be of great benefit to you in the problem-solving discussion period following the presentation of the course material

1. Why are my young players on the same age-group team not the same size?

2. Why are some children so much bigger and stronger than similar age children?

3. Where do the "big" kids play on my team? Why do they play that position?

4. Why are some girls more advanced than others in their secondary sex characteristics?

5. Why can some 12 to 15 year old girls perform usually as well as boys of comparable age in many sports?

6. Are most 10 - 13 year old girls taller and heavier than comparable age boys?

7. What about the "little guy"? Will he ever grow?

8. Do all children begin their pubertal growth spurt at the same time?

9. Are there possible psychological problems associated with growth that are easily identifiable?

10. Should children be matched for competition based primarily on age or should we seek some other criteria?

These are just a few questions to assist you in looking again at children, hopefully, in a more inquisitive manner.

If you want further direction and information concerning growth and development, consult the physical development chapters in most general psychology texts.

Exercise Physiology

INTRODUCTION

During the introductory sessions, we developed a method of looking at sports performance based on the challenges placed on the different systems of the body. These processes which include the nervous, circulatory, respiratory and muscular systems are either directly involved in controlling the actions of muscles or in providing substances to the muscle for the production of energy.

In our review, we concluded that on this basis, activities could be classified into:

- Activities requiring fine manipulative skills.
- Activities requiring quickness or speed.
- Activities requiring development of maximum tension.
- Activities requiring sprint or speed endurance.
- Activities requiring sustained or prolonged performance.

Our basic premise for attempting this classification was to gain some insight into the factors which could limit performance and thereby enable us to provide for their control. This information can be critical in the selection of particular offensive and defensive systems, in the strategy employed during a game, in the deployment of personnel and in the execution of particular skilled behaviors. Further, it is information of this nature which can give us a base on which to structure training and conditioning routines so that we might better prepare our participants for maximal effort.

Since it is important that you understand the application of physiology to meet these objectives, let's elaborate further with reference to some specific examples.

1. Selection of Offensive and Defensive Systems

Many team sports have a complex of different systems that can be employed during a game. To a large extent the selection of a particular system will depend upon the skill attributes of the players and/or the weakness of the opposition. Another factor that must be considered relates to the energy costs or demands induced by the system. It is possible that a particular system may make excessive demands on the players, promoting early fatigue and a reduction in performance capability. An example of this could be a full court press in basketball or a press in hockey where the intent is to cover the opposition very closely in the offensive end. Such procedures can place an extreme demand on the energy systems, making recovery very difficult. A coach must be aware of this when selecting a game plan.

2. Strategy Employed

Associated with the first application is the particular strategy that a coach elects to employ. In running, as an example, it is common practice to utilize different tactics to put your opponent at a disadvantage. A competitor may set an initial fast pace in an attempt to break the opposition or he may elect to wait , with the intention of executing a final kick . In team situations, a coach may decide to use short shifts with many line changes or he may elect to employ fewer, longer shifts out of the belief that the player needs to adjust to the tempo of the game. In many cases, quite different challenges can be placed on the different systems of the body and unless the coach has some realization of the affect of these different strategies, he/she may unknowingly reduce the players' effectiveness.

3. Deployment of Personnel

The coach is constantly confronted with the challenge of placing competitors in the right event, the right position or on the right line. Numerous factors must be considered before a confident decision can be made. Again, since different events and/or positions require different skills and capabilities, it is necessary to match the attributes of the player with the demands of the event. As an example, little success would be expected in misplacing a player in an event which required speed when he/she is more suited for activities where strength is the most important factor. Understanding the physiological basis of the sport and the capabilities of the players makes it easier to solve problems associated with placement.

4. Training

The fact that we have established five different classifications for understanding the physiological basis of sports performance suggests that training techniques

must be in large part specific to the requirements of the sports activity. A distance runner who must be able to produce large amounts of energy over a prolonged period would be expected to benefit little from the training program used by a sprinter whose training program would emphasize production of maximal amounts of energy over short periods.

In summary, this overview gives you some insight into the applications of physiology for the improvement of performance. The modern coach must have a good understanding of basis of body function if he is to employ these applications effectively.

THE BASIS OF PHYSICAL ACTIVITY

For physical movement to occur, muscle contraction must take place. The significance of muscle contraction is that it can produce a shortening of the muscle and by virtue of its attachment to another bone across a joint, it can cause a displacement of the bone. However, for muscle contraction to result, energy is needed. This energy exists in the form of a chemical compound (ATP) and it is released by the breakdown of this compound. The availability of this energy permits the muscular contraction to occur which in turn leads to the mechanical work we are interested in. The situation is similar to the combustion engine. Gasoline and air are introduced into a cylinder, which when ignited results in explosive combustion. This causes expansion and movement of a piston which through mechanical arrangements transfers motion to the wheels. See Figure 1.

For emergency situations, a small store of ATP along with another high energy compound (CP) are deposited in the muscle located at a site close to where it is to be used. However, during physical activity, this supply can be quickly used and if contraction is to continue, these chemical compounds must be continually regenerated. Our problem is to understand the manner in which these compounds are formed, since as we shall see, different forms of physical activity are dependent on how much and how quickly these chemical compounds are produced.

Essentially the process begins with the digestion of food which is converted in the body and becomes the fuel needed for combustion. If oxygen is available, the fuel is combusted and water and carbon dioxide are formed along with quantities of the chemical compound we are interested in. Energy which is obtained from this source is called oxidative or aerobic energy.

In many types of athletic contests, it is difficult to obtain enough oxygen from the atmospheric air. The individual is able to continue in such circumstances only because of a special ability to partially break down the fuel and produce a limited supply of the chemical compound. Since this can occur without the presence of oxygen, the term used to describe this form of energy is anaerobic. In this case, carbon dioxide and water are not the end products but rather an acid is formed called lactic acid. As we shall see later, the formation of this substance has much to do with causing fatigue.

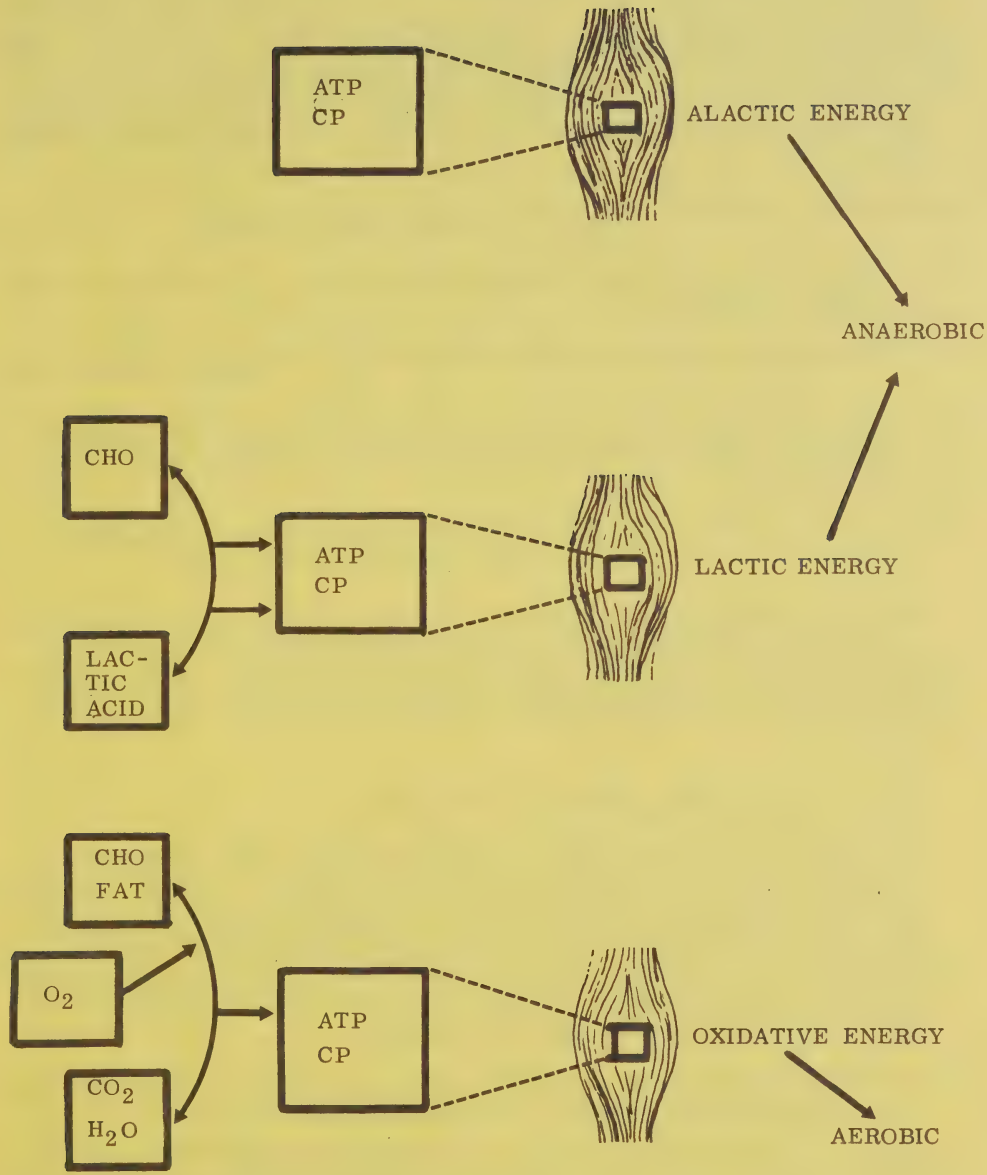


FIGURE 1 SOURCES OF MUSCULAR ENERGY

So far, we have said little about the actual nature of the fuel used in the processes described above. The food that is eaten exists in the form of carbohydrates, proteins and fats. In normal situations, only two of these foodstuffs are important as fuels and their relative importance depends on the type of physical activity engaged in. If the activity is fairly light in nature and oxygen supply is plentiful, the most important fuel is fat. As the exercise becomes more intense and it becomes more difficult to secure enough oxygen from the air, the emphasis shifts to carbohydrates or more specifically to the sugar stored in our muscles. As we shall see later, there is a special type of fatigue which occurs in athletic performance which can be traced directly to the depletion of this sugar from our working muscles.

Let us quickly review the various ideas that have been developed.

1. Energy muscle contraction comes from the breakdown of a chemical compound located in the muscle.

2. Fuel needed to produce the chemical compound is obtained from the food we eat.

3. Aerobic energy is obtained when the fuel (largely fat) is combusted with oxygen. Anaerobic energy is derived from the incomplete breakdown of the fuel (carbohydrate).

4. In the case of the aerobic system, the end products are water and carbon dioxide. In the anaerobic system the end product is lactic acid.

When we understand the sources of energy supply in physical activity we are well on our way to comprehending the mechanisms which limit performance. The reason for this is that these different energy delivery systems are different in terms of the amount of energy they can produce and the rate at which they can produce it.

SYSTEMS SUPPORTING MUSCLE CONTRACTION

You now have some concept of how we obtain energy for muscle contraction and consequently for physical activity. As indicated earlier the situation is somewhat similar to the combustion process that occurs in an automobile engine. However, we have not acknowledged the importance of many other structures essential for physical activity. If we can understand these, then we will be in a better position to appreciate their importance in different types of activity and consequently the value of different training and dietary procedures.

Muscles are the contractile units of the body because they are able to shorten and produce motion when stimulated. This shortening ability of the muscles is permitted by the fact that the muscle is composed of many thousands of small filaments which are pulled over each other by forming bridges. It is the energy supplied by the breaking of high energy chemical compounds which permits the formation and breakage of these cross bridges to occur.

Muscles must have something to pull on and as a result, we have a skeleton composed of a central frame and four limbs joined by a series of moveable joints. The four hundred and thirty four voluntary muscles in man, attached at different points, enable him to move the joints in different planes thereby permitting large activities such as walking and running to fine manipulative activities such as picking up or throwing an object.

For coordinated activity to occur, whether it be walking, running or manipulating an object, very specific muscles must be stimulated to contract at the right time and with the right intensity. This is permitted by our nervous system which can send down information for specific areas in the brain directing the muscles to act in the desired fashion. As we shall see later, information must also be able to get to our coordinating centre in the brain from the environment providing us with the necessary background for an appropriate movement.

We now have the nervous and muscular basis by which we can understand physical activity and we have indicated that energy is necessary for contraction to occur. However, we have left many gaps in our appreciation of the energy associated processes.

The energy for muscle contraction is stored in a chemical compound in the muscle. Since these compounds may be produced by aerobic and anaerobic processes, we must have a series of chemical reactions or generators to complete the necessary transformations. There are special structures in the cell which contain many of the ingredients necessary to accomplish this.

It is essential that raw materials such as oxygen and fuel be supplied to these powerhouses so that combustion can occur. This is accomplished through a plumbing system consisting of the large blood vessels and smaller communicating vessels which course through the muscle. The plumbing system also provides for the removal of waste products that accumulate as by-products from the metabolic reactions.

The oxygen that is needed is obtained from the atmospheric air and this source can provide an unlimited supply. However, we have the problem of delivering it to the distant tissues. The respiratory system functions to bring the oxygen into lungs and blood. Large amounts of oxygen can be picked up by the blood because of a remarkable pigment we have which combines with the oxygen. One problem still remains and that is pumping the blood which contains the oxygen, to the areas where it is needed. The responsibility for this task rests with the heart. Each time the heart beats, it pumps a certain volume of blood out into the blood vessels so that the essential materials can be delivered to their destination. The waste products such as carbon dioxide and lactic acid can also be picked up on the return journey and delivered to their destination in much the same way.

In exercise, the requirements for oxygen increase because of the greater energy demand. The respiratory system and the heart respond by increasing their output to satisfy the increased demands. As an example, the heart rate increases in a

very predictable fashion as the intensity of the exercise goes up. This fact is very important in controlling the intensity of training.

All of these supporting systems require specific foods either to produce energy or for tissue construction or simply to control chemical reactions. The foods we eat contain the components water, protein, fat, carbohydrates, vitamins and minerals. These are all essential to our health, and must be obtained in sufficient quantities each day. A specific food contains one or more of the nutrients in a fairly consistent ratio. By selecting a variety of good foods each day, the proper balance of essential nutrients can be obtained.

PROTEIN is found in best amounts in meats and dairy products. Nuts, grains and some vegetables also contain protein although generally of poorer quality. Protein is used in the body for building new tissue and replacing worn out tissue. It is particularly important during the growing years. Some tissues containing protein are muscle, tendon, cartilage, ligaments, blood vessels and heart.

CARBOHYDRATES are found in foods of plant origin. Starches in bread, potatoes and grains and table sugar (sucrose) represent the major sources of dietary carbohydrates. Fruits, honey, candy and pop are other sources of carbohydrate. In the body, the various dietary carbohydrates are converted into glucose. Glucose is used as a fuel by nerves, brain and muscles. The human body stores only small amounts of glucose in the liver and muscles. It has recently been discovered that glucose is the fuel used by the muscles during strenuous activities such as hockey. Therefore, it is important to obtain enough carbohydrate in the diet each day so that a player may work hard right up to the final whistle.

FATS are obtained from animal and plant food sources. Meats, dairy products, butter, margarine and nuts are good sources of fat. Unlike carbohydrate, fat may be stored in almost unlimited quantities in the body. Even a thin person has about 5 per cent body fat. Fat is used by most body tissue as a fuel. When it is broken down in the cells with oxygen, energy is released. But during vigorous activities muscles prefer glucose (carbohydrate) as a fuel instead of fat.

VITAMINS are found in tiny amounts in most foods we eat. But since there are 15 different vitamins, it is imperative to eat a variety of foods to make sure no vitamins are missed. Fruits, vegetables and cereals are excellent sources of most vitamins. In the body, vitamins perform essential regulatory roles. They make sure that the complex chemical reactions occur at a proper speed. When we exercise, these reactions are greatly speeded up, and it is here that minor vitamin deficiencies become most apparent.

MINERALS are found in almost everything we eat. There are at least 17 minerals required by man in his diet each day. Some of the minerals, such as calcium and phosphorus, are required in large amounts each day, particularly during growth. Others, required in only small amounts, are often difficult to obtain. Iron is a good example of a mineral that is all too often lacking in our diets. When this occurs the individual is said to be anemic for the blood cannot transport enough oxygen to enable the person to work hard.

WATER is often considered to be the most important nutrient of all. A person may live for weeks without food, but can't last more than five days without water. Water makes up about 70 per cent of our body and is found in all cells and tissues.

If we exclude water, the other food nutrients fit into three classes as far as function is concerned. Energy foods (fats and carbohydrates) are broken down in the cells to provide energy for movement, growth and other body activities. Structural nutrients, particularly proteins and the minerals calcium and phosphorus make up the various bones and tissues of the body. Regulatory nutrients, vitamins and minerals, make sure that the detailed processes of the body occur in a controlled and coordinated fashion.

CLASSIFICATION OF FOODS

Most nutritionists classify foods into four categories for simplification. By following the recommended intakes of each food group in the accompanying table the chance of nutritional defect is very low. However during times of great activity and during growth periods, additional food is required. It is then advisable to add one or more servings from each food group. Candy, pastries, donuts and pies should not be used as food replacements. While these foods have a definite energy value, they are all too often very low in other essential nutrients. The following table provides a useful guide for food selection. If team meetings are held, coaches may find discussions of what to eat a very worthwhile exercise.

In summary, we have received considerable information on the basic systems that are needed to permit participation in sports. All of these systems are critical to performance. However, some have a greater emphasis than others, depending on the type of exercise.

You now have an appreciation of the complex of changes and reactions that occur in the human body and the specific functions they satisfy.

GUIDE TO GOOD EATING FOR THE YOUNG ATHLETE

FOOD GROUP	NO. OF DAILY SERVINGS	EXAMPLE OF COMMON FOODS	SUPPLEMENTARY FOODS
MILK GROUP	4 or more glasses	skim or powdered skim, particularly for those who are overweight two per cent best choice for normal build types whole milk for those boys who are underweight	cheese, ice cream, yogurt, cottage cheese and other foods made from milk can replace part of the milk requirement
MEAT GROUP	2 or more servings	meat, fish, poultry, liver, eggs or cheese lean cuts for boys overweight at least four eggs a week	dry beans, soya bean meat substitutes and nuts
VEGETABLES AND FRUITS	4 or more servings	include dark green vegetables such as spinach, green beans, broccoli, brussels sprouts, peas, green peppers, lettuce, asparagus yellow vegetables such as carrots, corn, cabbage fruits or juices such as oranges, grapefruit, tomatoes, apples, pears, two servings per day	potatoes dried fruits such as apricots and apples, also raspberries, strawberries, watermelon
BREADS AND CEREALS	5 or more servings	bread, enriched or whole grain cereals such as dry prepared breakfast cereals, cooked oatmeal rice, macaroni, spaghetti, pancakes, noodles	muffins, crackers, cookies, cakes made from enriched flours

CHARACTERISTICS OF THE ENERGY SUPPLY SYSTEMS

It was mentioned earlier that the different energy systems, aerobic and anaerobic are different in terms of the amount of energy that can be produced and the rate at which they can produce it. It is this fact which can determine how long and how fast one can continue work. Understanding the characteristics of each of these energy systems will enable us to appreciate their importance in different athletic specialities or situations.

Two terms will be used to describe the characteristics in question. One is capacity which relates to how much we can obtain out of a system. The other is power which relates to how fast we can get it. The situation is analogous to an automobile using gasoline. One type of gas may give good mileage but poor speed while another may have the opposite properties.

1. Stored Energy

Stored energy in the muscle, although in limited supply, also has a power and a capacity. The power of this system is very large compared to the actual amount of energy deposited in the muscle. This system can produce large amounts of energy but only for a short period of time. If total depletion was possible, there would only be enough to last several seconds of work. In reality, the time is somewhat less than this. To improve this system, it is essential that the activity be very intense in nature in order to promote increased power and brief in duration so as not to prevail on another energy source. This energy source has been called anaerobic alactic since oxygen is not used directly and no lactic acid is produced.

2. Anaerobic Lactate

Power output in this system appears to be limited by the rate at which the chemical energy can be generated, the value being below which can actually be used. This would indicate that the intensity of the exercise would have to be reduced once this system comes into play. The capacity, on the other hand, relating to how much energy can actually be derived from this system, is higher than the alactic system. Therefore, based upon the rate at which this energy can be used, there is enough for approximately 40 seconds activity. The limited capacity of this system is believed to be associated with the build up of acid that results in the muscle. To improve this system, training situations must be designed of sufficient duration and intensity so that rate at which energy is delivered is challenged and peak acid values are attained to promote improvement in capacity. Since no oxygen is used, this energy source is called anaerobic and since lactic acid is produced the term used is anaerobic lactate.

3. Aerobic

In situations where the activity is carried on continuously for longer periods of time, the circulatory system has the opportunity to adjust to the increased demands and oxygen is then used to combust with the carbohydrates or fats for the supply of energy. The extent to which the oxygen can be supplied to the muscle from the atmosphere and the ability of the muscle to use oxygen, determines the amount of energy realized and therefore the power of the system. As can be seen in Figure 2, it is only about 30% of the power from the stored energy. We usually speak of an unlimited capacity for this system since fats of which most of us have a lot of, can be used as the gasoline. However, in reality, and this is especially important in some sports that once we deplete the carbohydrate stores we may be able to continue working aerobically but we must do it at a reduced rate.

In summary, the performance that you see is made possible by these different energy sources. The object of training, therefore, is to develop situations or drills that will load on these specific areas and in so doing optimize the rate at which adaptation occurs.

An additional problem is the relative importance of these energy sources in different types of work. You now have some insight into this, but Figure 3 should make it clearer. Represented on this diagram are three different durations of super-exertion with the approximate percentage contribution of each energy source.

For ten seconds work, energy comes basically from the stored system with a small contribution from both the aerobic and lactate systems. With 30 seconds of super-exertion, the stored system becomes progressively less important because of its limited supply with the lactate system assuming a much greater importance. With 120 seconds work, the lactate system is even more important along with substantially larger contribution from the aerobic system. If the work is prolonged for 15 minutes, virtually all of the energy would come from aerobic metabolism, utilizing oxygen from the atmosphere. The principle is that the longer the work is continued the more important is the aerobic component.

On the basis of what has been said, it should be clear that performance is quite specific to the situation. An individual may have an extremely well developed aerobic capacity but may be well below average in the ability to deliver energy anaerobically. This individual would be expected to excel in the longer events but would do poorly in shorter more explosive events.

The point that is critical to all of this is that for any sport, we must know the energy sources that are important to the performance of that sport. If you can identify the physiological basis of a sport, then we can think more definitely of the kinds of things that are necessary for success and additionally, what to train for.

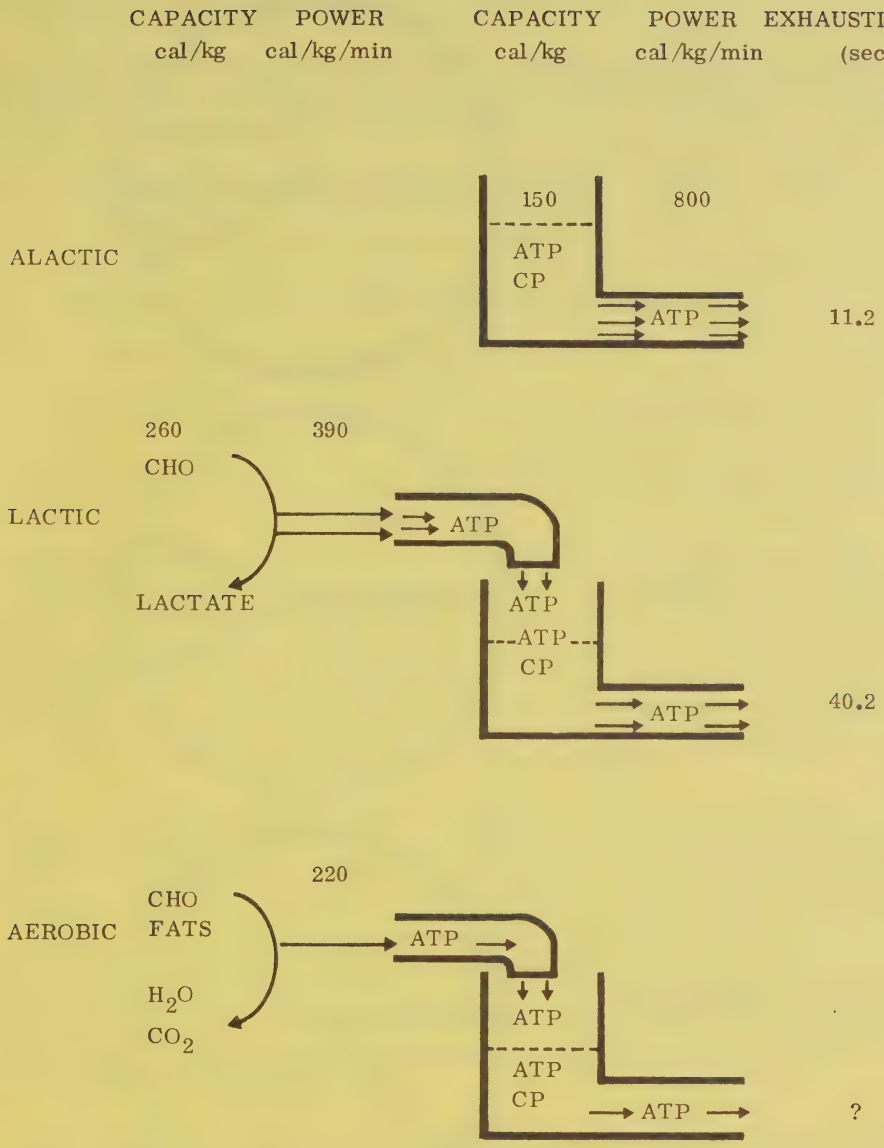


FIGURE 2

POWERS AND CAPACITIES OF ENERGY SYSTEMS INVOLVED IN MUSCULAR WORK

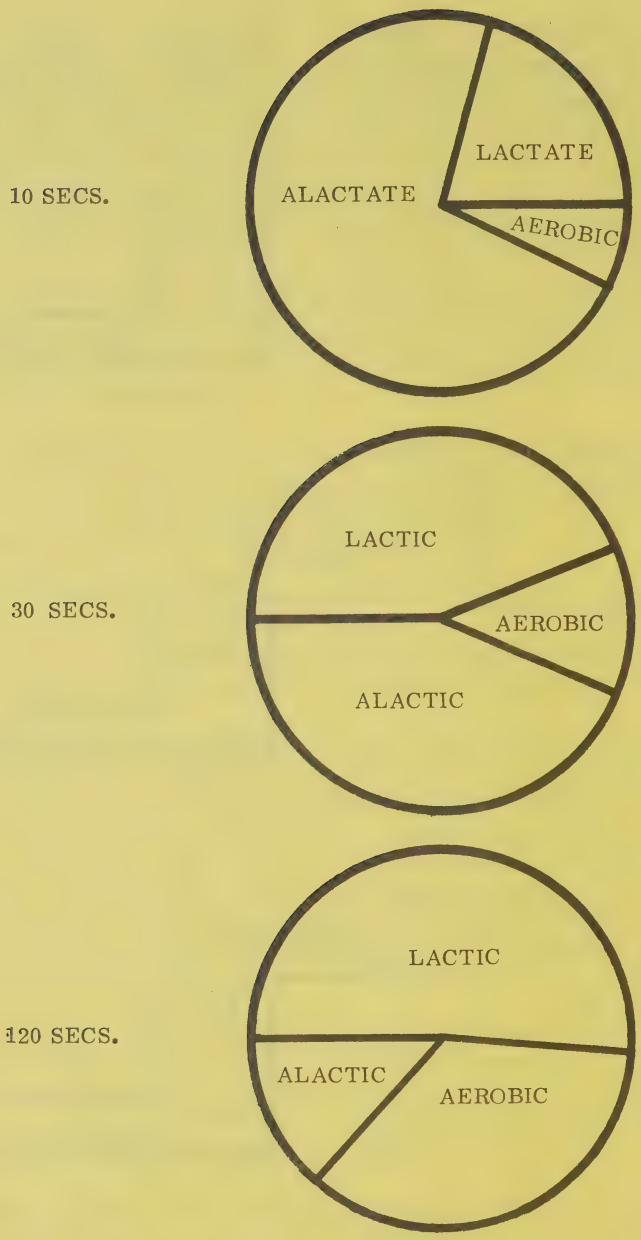


FIGURE 3

CONTRIBUTION OF ENERGY SOURCES DURING SUPER-EXERTION OF DIFFERENT DURATIONS

RE-EXAMINATION OF CLASSIFICATION SYSTEMS

We began by dividing physical activity into five different classifications and indicated that our underlying rationale was on the basis of the challenges placed on different systems of the body. Classifications were:

- Activities requiring fine manipulative skills.
- Activities requiring quickness or speed
- Activities requiring development of maximum tension.
- Activities requiring sprint or speed endurance
- Activities requiring sustained or prolonger performance.

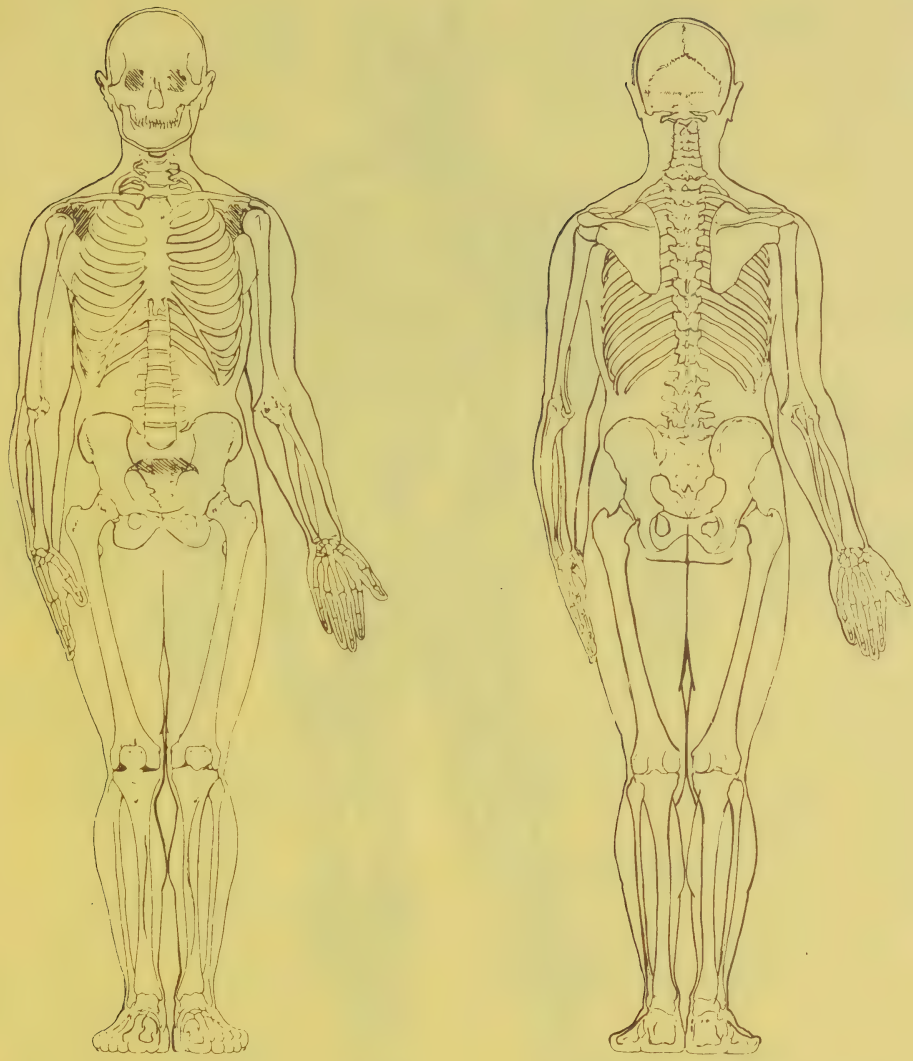
Let us re-examine these activities in the light of the additional information we have.

In the first classification, "activities requiring fine manipulative skills", the emphasis is not on any energy delivery system but on the individual's ability to control the timing, intensity and duration of muscle action. This is accomplished primarily by the nervous system with the master control resting in the brain. Examples of activities of this nature might be rowing, hitting and catching in baseball, bowling, fly casting, target shooting, fencing and golf. Indeed, the skills used in all sports depend upon ability to properly direct muscles, however in some sports the factor is considerably more emphasized.

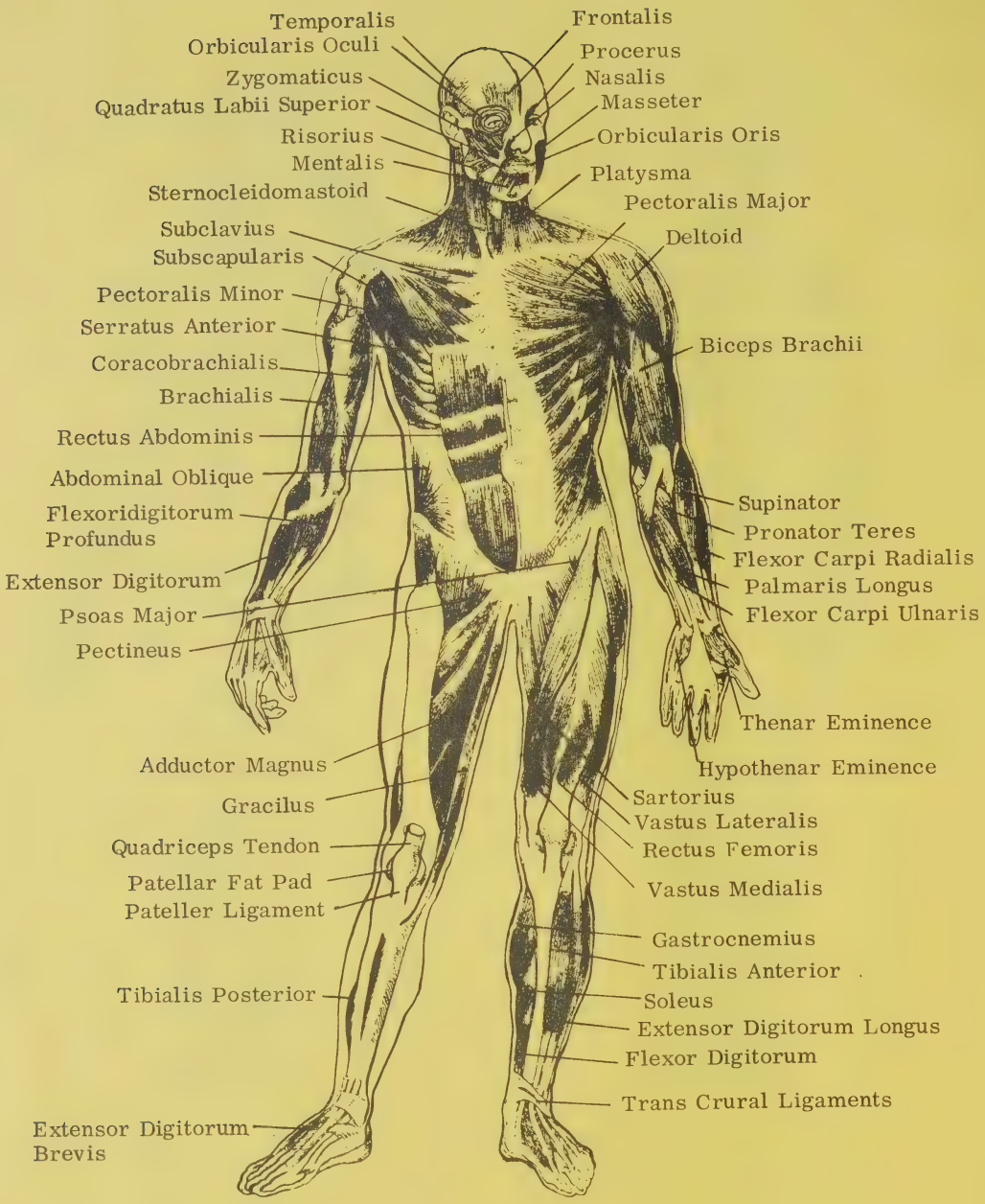
In the classification relating to the development of maximal tension, wrestling, football, weightlifting and gymnastics are four sports heavily dependent on this ability while many other sports such as ice hockey, soccer and basketball also contain situations where this can be observed. The ability to develop large amounts of tension or strength is very much related to the size of the muscle or as previously described the number of filaments that they have. As you are aware, to obtain increases in strength, there are very specific procedures that must be followed. These will be developed later. The point is that individuals who are stronger, other things being equal, would be expected to excel in activities represented in this classification.

The remaining three classifications, "speed", "speed endurance" and "prolonged endurance" depend in large part on the energy characteristics of the delivery systems that we have discussed. The maximal speed that we can attain relates to the rate at which we can utilize the stored energy in the muscle. This is not a large supply, but what there is can be used very rapidly. In other words, the power characteristic of this system is very high.

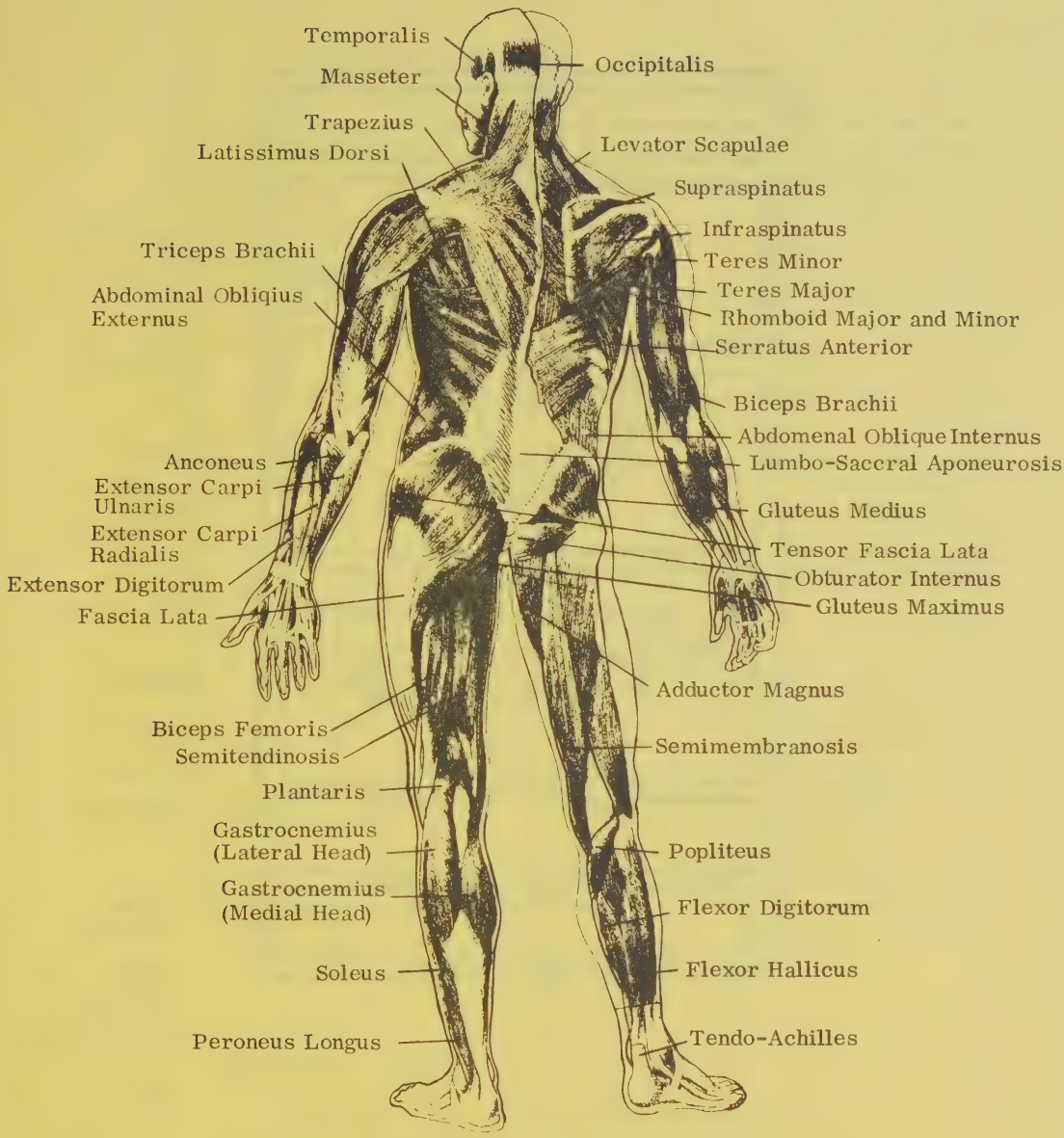
Biceps provide force with leverage from forearm.



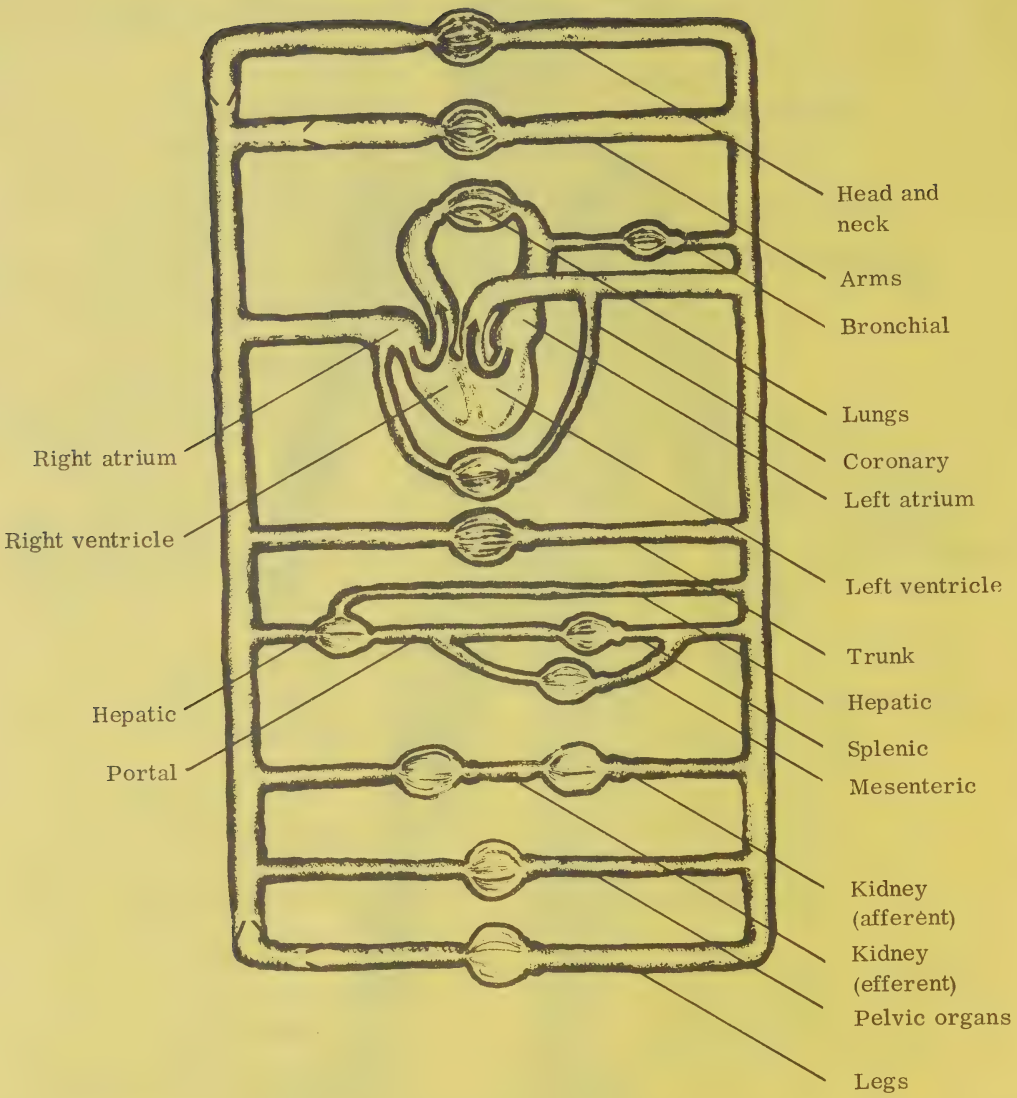
Skeletal projection on body surface - anterior and posterior views.



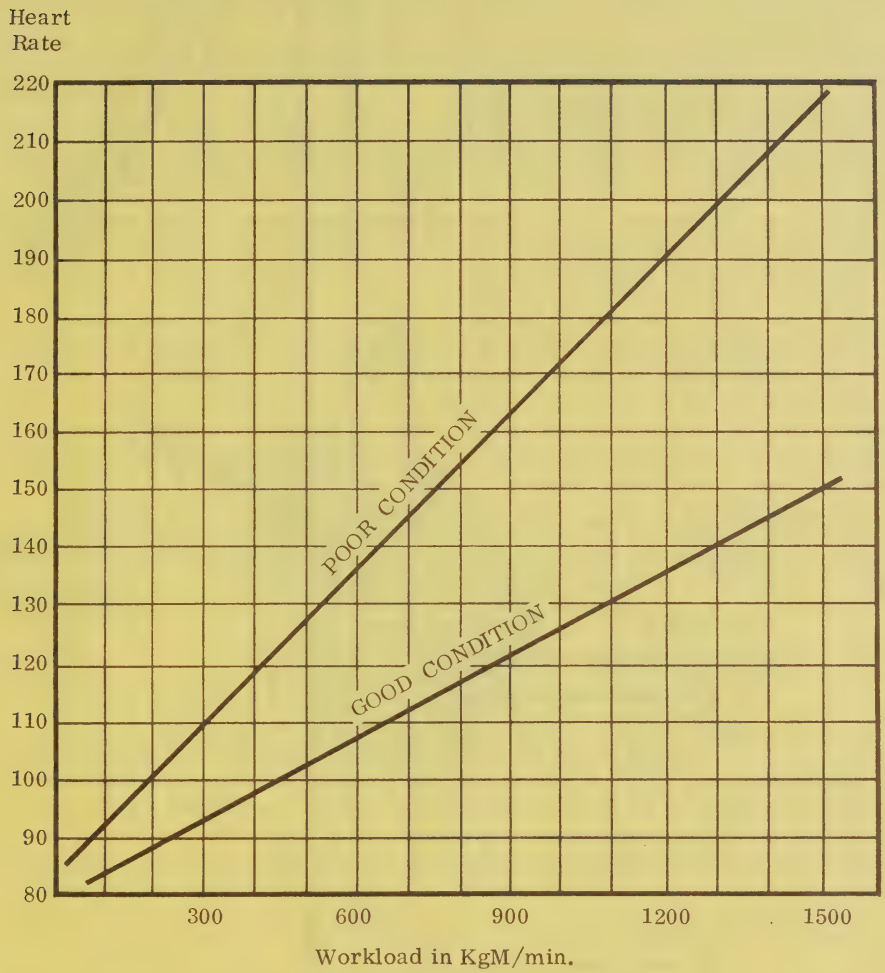
Muscular system - anterior view



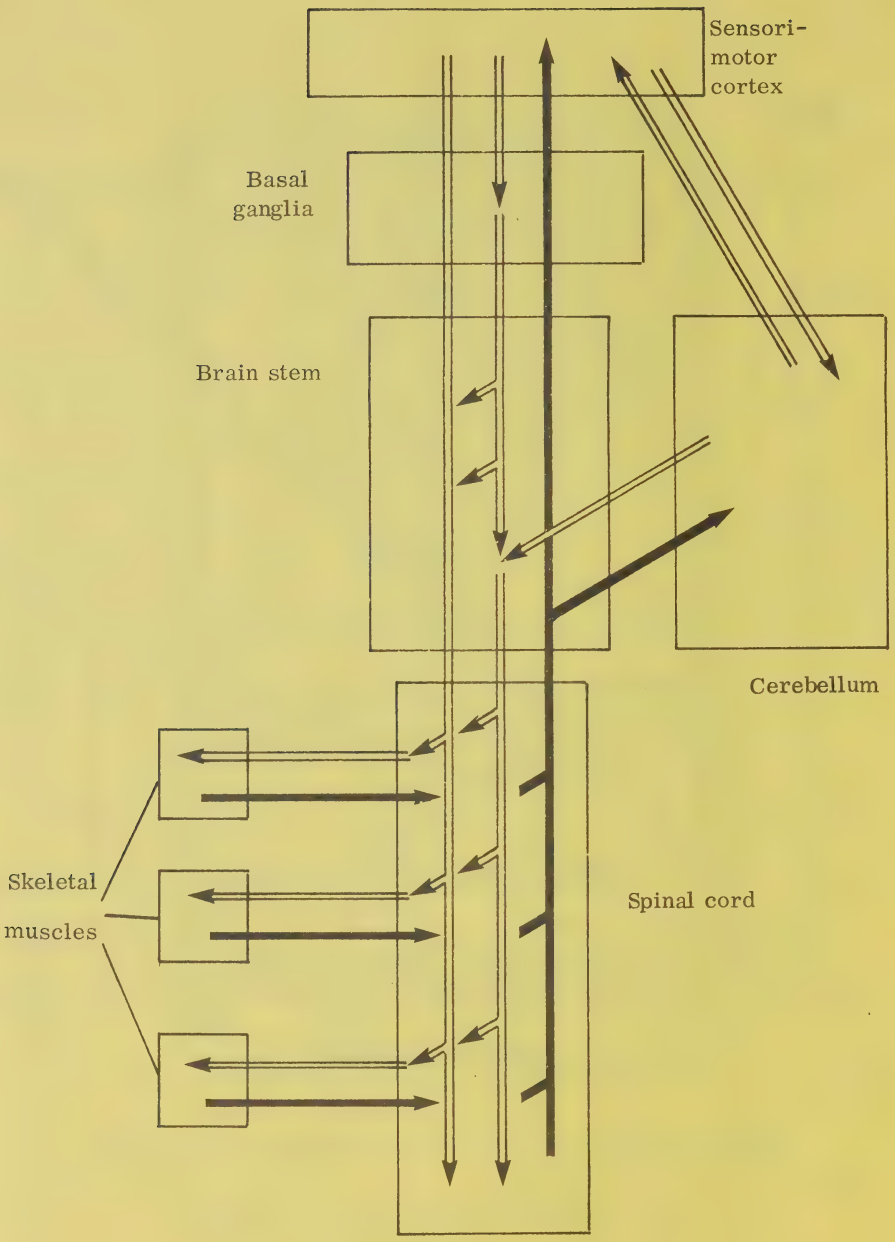
Muscular system - posterior view



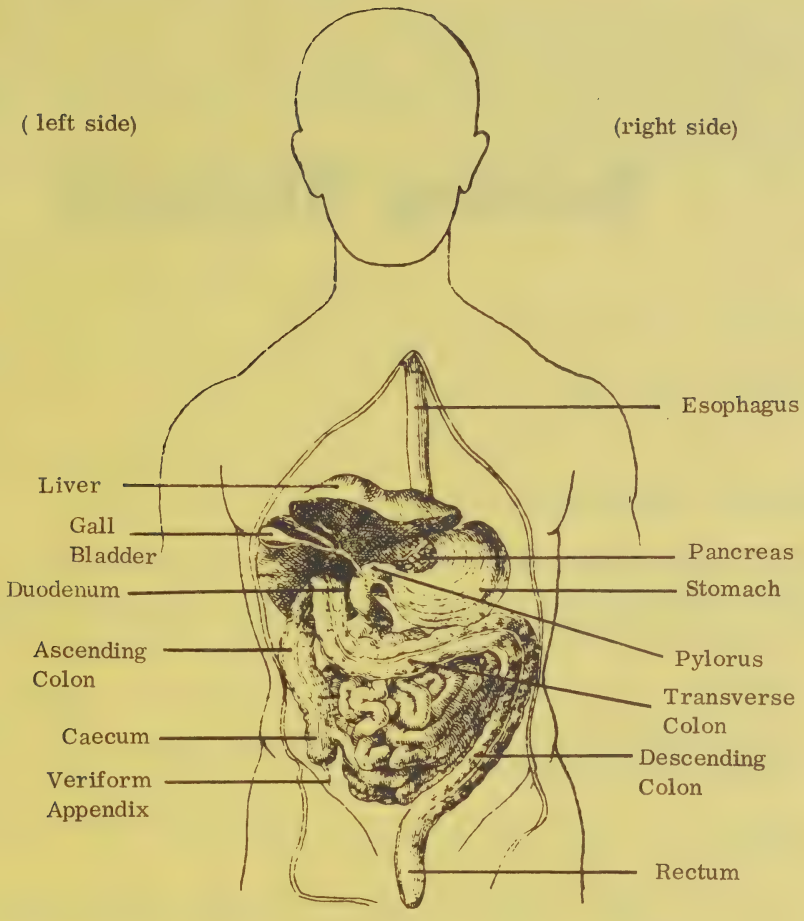
Circulatory system diagrammed schematically to illustrate the parallel and series arrangement of vessels involved. Thin lines connecting the arteries (on the right) with veins (on the left) represent the capillary beds. Swellings adjacent to the capillary beds represent resistance vessels (arterioles).



Physical condition charted in terms of increasing heart rate with increasing exertion.



Motor systems diagrammed in blocks representing major subdivisions of the nervous system. Sensory connections are identified by shaded arrows, motor and nonsensory connections are indicated with unshaded arrow.



General plan of the digestive system.

Training Methods

NOTES FOR THE COACH

Training methods is the last area presented in the eight units of Level I of the Ontario Coaching Development Program. Obviously, this is advantageous, in that it allows you to apply material previously presented. This set of notes will:

1. Set forth a series of questions that you should attempt to answer prior to the instructor's presentation. The total emphasis in Level I in Training Methods is on one essential facet - i.e. A Season's Training Program. This initial series of questions focuses on this.

2. Set forth a series of questions that will be employed in the instructor's presentation and subsequent group discussion.

3. Set forth a series of projects that you can employ subsequent to completing Level 1. These can be used for self-evaluation and to possibly adapt some of your present practices.

A SEASON'S TRAINING PROGRAM

What is Training?

Training in its simplest concept consists of chronic exercise carried out over a relatively long period of time. The vast majority of research consists of low to moderate intensity, very short duration and low frequency studies. The three generalizations that appear most applicable to sport training are that training is based upon overload, is very specific, and is reversible.

What Areas Should the Coach Consider?

An essential element for success in all competitive sports appears to be careful planning of a Season's Training Program. This is not the same for all sports and probably differs for various competitive levels of the same sport. Answer the following questions, applied to the specific coaching you do, before the clinic time allotted to this area. This should allow you to be more aware of the specific problems inherent to the athletic activity you provide leadership in.

1. What sport do you coach?
2. What level of sport do you coach?
3. Do you coach one or both sexes?
4. Is training (as defined in What Is Training? section) employed in your sport?
5. How much is training employed in your sport?
6. What are some of the human factors you might attempt to improve through training?
7. What is (are) the most important trainable factor(s) in your sport?
8. How did you arrive at an answer for 7?
9. Are there other possible sources of information that might be employed to answer 8?
10. Are there other areas that you might consider in planning a Season's Training Program?
11. Endurance is an important aspect of many sport endeavours. What are some of the key questions that you would like answered about endurance training?

Coaches' Clinic

You have just seen a short visual presentation outlining A Season's Training Program. You should have focussed your attention to three questions:

1. WHAT AREAS SHOULD BE CONSIDERED WHEN YOU PLAN YOUR SEASON?
2. WHAT ARE THE KEY QUESTIONS THAT YOU SHOULD BE ABLE TO ANSWER WITH RESPECT TO EACH OF THE AREAS IN (1)?
3. WHICH OF (1) AND (2) ARE MOST RELEVANT TO THE SPORT YOU COACH?

Small Group Discussion

You will break into sub-groups of five or six. Each group will represent either one sport or a cluster of sports with similar needs. Your group will discuss and provide an answer for each of the following questions. The purpose of this is to have you apply the concepts which have been presented to your sport(s).

Key Questions for Small Group Discussion

1. Which is more important to your sport - aerobic or anaerobic training? How did you determine this?
2. How would you train the energy source which is more important to your source?
3. Is pace training important to your sport?
4. How would you teach pace?
5. How important is strength to your sport?
6. As a coach what are some of the ways that you might use to develop strength?
7. Are there any safety factors that you might emphasize in strength training?
8. Is flexibility important to your sport?
9. What are some of the possible techniques that you might employ to monitor the training of your athletes?
10. Does training affect skill performance?
11. What would you tell your athletes about diet - during the season? pre-game?
12. Does training affect skill performance?
13. What incentives would you employ to make people train harder?
14. How can you minimize injuries during the training part of your sport?
15. Does the environment affect training in your sport?

Large Group Discussion

Complete the following chart for the sport that is the most important to you during the group discussion.

AREA (List the areas that a coach should consider in Planning a Season.)	SPORT ( )
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	
11.	

CODE V = Very Important
I = Important
U = Unimportant

Self Quiz

The following ten multiple choice questions are aimed at evaluating your appreciation and application of the concepts presented in the Training Methods module.

Test yourself. The correct answers are on the page following the last question.

1. Frequent, hard exercise extended over several weeks is:
   a) conditioning
   b) physical fitness
   c) training
   d) not necessary in some sports

2. The energy employed for successful athletic performance:
   a) is related to the duration of the event
   b) is approximately the same for all events
   c) differs considerably for all activities
   d) is derived equally from aerobic and anaerobic sources

3. Ineffective use of available energy is usually due to:
   a) trying to win
   b) getting caught behind slow runners
   c) inadequate pace training
   d) trying to save energy to sprint

4. Strength development is most important to:
   a) agility athletes
   b) endurance athletes
   c) speed athletes
   d) power athletes

5. Evaluation of your athletic program should:
   a) emphasize examination of winning
   b) emphasize physiological factors such as strength
   c) emphasize psychological factors such as motivation
   d) examine as many contributing factors as possible

6. Skill practise should place major emphasis on:
   a) those skills that the athlete is proficient at
   b) poor skills, with limited review of proficient skills
   c) an equal balance between poor and proficient skills
   d) the skills that the athlete is not proficient at

7. Successful coaches recognize the importance of incentives and:
   a) de-emphasize them
   b) plan them carefully
   c) consider the athlete's age
   d) de-emphasize them with young athletes

8. The environmental conditions, under which the athlete must compete, should be:
   a) disregarded in a country such as Canada
   b) anticipated and carefully planned for
   c) disregarded in Canada, except for cold
   d) recognized as only important with respect to heat

9. A coach should plan an athlete's work-outs:
   a) keeping the team in mind
   b) as specifically as possible
   c) keeping the next competition in mind
   d) the night before

10. Coaches should aim for:
   a) significant winning performance
   b) tough, dedicated athletes
   c) significant performance improvements
   d) strong athletes who won't quit

Answers to Self Quiz

As in most sets of multiple choice questions there is possibly more than one correct answer. The answers that appear most appropriate are:

1 - c
2 - a
3 - c
4 - d
5 - d
6 - b
7 - b
8 - a
9 - b
10 - c

Post Clinic

Successful coaches in all sports ranging from age-group coaches to Olympic and professional coaches constantly evaluate their training program in their quest for improved performance.

The following projects may be carried out after participation in this clinic. It is a further attempt to have you apply the concepts which were presented.

Your Next Season

The following series of questions could be answered before your next season commences. When possible, answers are provided on the following page. Test yourself!

1. Will you do anything different in Planning Your Season's Training Program this season?
2. How can you find what is really important to success in your sport?
3. How can you find the most effective training techniques?
4. How does motivation and training interact?
5. Should an age-group athlete follow the same training schedule as an Olympic athlete?
6. How can you determine if your athletes are improving in the things you are attempting to train?
7. What do you want to learn most about in your sport?

Answers to Your Next Season Questions

1. This obviously depends on you! The most successful coaches in the world are quite critical of themselves and change their programs.

2. a) Go to a technical clinic in your sport.
   b) Talk or write to authorities.
   c) Read critically.
   d) Observe your sport carefully!
   e) Attend a Level II Clinic.

3. Unfortunately it takes a long time for research on the most effective training techniques to filter down. The answers for 3 are probably the same as for 2 except that the two best sources are probably -
   - technical clinics
   - Level II Clinics

4. Training, in many instances, is arduous, boring work. It requires highly motivated athletes and incentives. Intelligent coaches recognize this and provide incentives such as
   - feedback
   - fun
   - a good environment
   - reasonable recognition

5. No! The training of an Olympic calibre or professional athlete is approaching a full-time occupation. Age group athletes can improve, have fun and build the base for future excellence (if talent and desire are present) without investing the incredible time, energy and emotional stamina of the more senior athletes.

6. Eventually more sophisticated techniques will be provided to monitor training. Relatively simple tests will indicate if your athlete is improving. For example:
   Endurance - distance run in 15 minutes
   Speed - time for 440 yards.
   Strengths - Number of push-ups
   Number of chins

   In all instances a standardized technique should be used.

7. Coaches should ask these questions. Look for the answers as outlined in (2) and (3).